BONNEVILLE POWER ADMINISTRATION

Transmission Business Line (TBL)

ATC Methodology, (Appendix 6)

Power Flow Base Case

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This document describes the Power Flow Model and Base Case Assumptions used for calculation of Available Transfer Capability (ATC).

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1. Power Flow Model.

a. The power flow model is a mathematical representation of the actual lines, transformers, loads, and generators that comprise the Columbia River Power system. A key output of this model is a computation of how much power will flow over each element in the power system for the assumed load and generation levels.

b. For the planning ATC calculations, power flows representing projected system conditions in each calendar year were modeled. Subsequent analysis will use base cases that reflect new or changed system conditions, particularly the addition of major new transmission facilities.

c. Northwest generation levels and load were limited to firm commitments on the Bonneville transmission system to the extent possible. Since this creates a discrepancy between total Northwest generation and load, Intertie flows were adjusted accordingly.

d. The power flows over Network Flowgates were identified.

e. The difference between the power flow and the TTC becomes the Planning ATC for the Flowgate. One Planning ATC is established per Flowgate, per season.

2. Power Flow Base Case Assumptions.

a. Representative seasonal power flow cases were developed.

b. Normal peak (I in 2 year) load forecasts were used for all seasons. For the winter season, an additional power flow base case using extra heavy loads (1 in 20 year) was developed. The extra heavy loads were used in determining the planning ATC for the Cross Cascades Flowgates.

1. Load forecasts for utilities that perform their own forecasts were obtained from such utilities as part of the TBL's standard process for base case development.

2. Load forecasts for utilities that do not do their own load forecasts were based on forecasts developed by the TBL.

c. Federal generation levels were set using a multiple step process. The Columbia Generating Station (formerly known as WNP-2) was assumed to be on-line at full load in the power flow cases in all seasons (in the Contract Accounting Methodology, however the plant was assumed to be off-line for maintenance during the months of April and May in the odd-numbered years). The portion of the plant's output that was not covered under federal PTP contract demand was deemed to serve all contracts that call out non-specific federal projects as PORs.

Generation levels at each of the federal hydro projects[1] were set by first determining each project's 90th percentile generation value by month for the period 1997 - 2002. The 90th percentile value means each such project was at or below these generation levels 90% of the time during the given month. Generation levels at the Libby, Hungry Horse, Dworshak, and Albeni Falls projects, however, were set based on the requirements set forth in the 2002 Biological Opinion. In addition, the generation levels at the Willamette Valley projects were set at the minimum levels seen by season during Calendar Year 2001 as shown below:

[1] Federal hydro projects include: Grand Coulee, Chief Joseph, Dworshak, Albeni Falls, Libby, Hungry Horse, Lower Granite, Lower Monumental, Little Goose, Ice Harbor, McNary, John Day, The Dalles, Bonneville, Willamette Valley Projects.

Willamette Valley Projects 2001 Generation Seasonal Averages[2]

	Winter	Spring	Summer	Fall
Big Cliff	8	15	3	3
Cougar	8	14	11	14
Detroit	40	44	48	31
Dexter	4	10	0	0
Foster	7	12	4	7
Green Peter	28	24	23	23
Hills Creek	8	8	10	7
Lookout Point	35	45	38	23
Lost Creek[3]	15	24	21	10
Sum	153	196	158	118

The generation at the federal hydro projects was then scaled to match the sum of the demands for all contracts that call out non-specific federal hydroelectric projects as PORs after adjusting these demands for the portion served by Columbia Generating Station, Libby, Hungry Horse, Dworshak, Albeni Falls, and the Willamette Valley projects. The federal PTP demands at each project were then added to this result to obtain the final assumed generation level for each federal hydro project. This overall method for modeling the federal resources is referred to as the "Modified 90th Percentile Method" and is used in both the power flow base cases and Contract Accounting Methodology.

d. Generation levels at the non-federal Mid-Columbia hydro projects were set at 90% of their historical output by season.

e. Non-federal thermal generators requiring transmission service on the federal transmission system were set at either their contract demand or seasonal capability, whichever was lower.

f. Non-federal resources that do not require transmission service from the TBL were set at levels obtained from such resource owners as part of the TBL's standard process for power system planning studies.

g. A summary of power flow assumptions is posted on the ATC Methodology page of the TBL web site.

3. Determining Planning ATC.

The power flow base cases for each season were run using the assumptions described in Section 2. The resulting flows across each Network Flowgate ("Planning Power Flow") were obtained and compared to each flowgate's TTC. The difference between the Flowgate TTC and the Planning Power Flow is the "Planning ATC".

[2] Calendar Year 2001 was used because its averages were the lowest of the last 6 years. Winter: December – March; Spring: April – May; Summer: June – September; Fall: October – November.

[3] Most recent data for Lost Creek is 1996. Data between 1996 and 2001 for Hills Creek and Lookout Point followed a pattern that was applied to Lost Creek's 1996 data to arrive at numbers used here. Hills Creek and Lookout Point were used as models due to their regional proximity to Lost Creek.

The TBL reserves the right to modify the Planning ATC at any time.

4. Parallel Flows.

The Network Flowgates do not necessarily represent all transmission lines across that particular constrained portion of the power system. In the Planning power flow studies for determining Planning ATC and TTC for the Network Flowgates, the TBL accounts for power flow across TBL facilities only. The flows on all facilities for several constraints follow. The information contained in the following is not intended to establish a formal allocation between the TBL and other transmission owners.

Constraint	CASE				
	MAY04M3 (MW)	JUN04M3 (MW)	A04M3 (MW)	J04M3 (MW)	J04EHM3 (MW)
West of McNary	2598	2511	2310	1852	1788
Coyote Springs - Slatt 500 kV	1801	1733	1578	1145	971
McNary - Ross 345 kV	295	284	260	380	450
McNary - Horse Heaven 230 kV	313	314	296	160	193
McNary - Boardman Tap 230 kV	189	181	176	168	174
South of Allston	2479	2504	2478	766	208
Allston - Keeler 500 kV	1369	1401	1420	122	-239
Lexington - Ross 230 kV	292	257	250	165	91
Allston - St. Helens 115 kV	75	78	76	42	35
Astoria - Seaside 115 kV	-12	-8	-7	-27	-36
Trojan - St Mary's 230 kV	286	292	287	129	77
Trojan - Rivergate 230 kV	229	240	236	83	59
Merwin - St. Johns 115 kV	151	159	128	150	111
Clatsop - Lewis & Clark 115 kV	89	85	88	102	110
South of Napavine	1889	1908	1996	550	600
Napavine - Allston #1 500 kV	973	982	1025	325	349
Paul - Allston #2 500 kV	916	926	971	225	251

Notes: (a) The "from" and "to" substations are listed in the direction of positive flow; (b) the underlined substation is where the flow is metered; and (c) numbers are rounded.

Revision History

04/14/2005	Reformatted document per current business practice standards.
02/11/2004	New Power Flow Base Case and assumptions based on 2006 infrastructure.
11/12/2003	This document was included as Appendix 6 of the ATC Methodology.